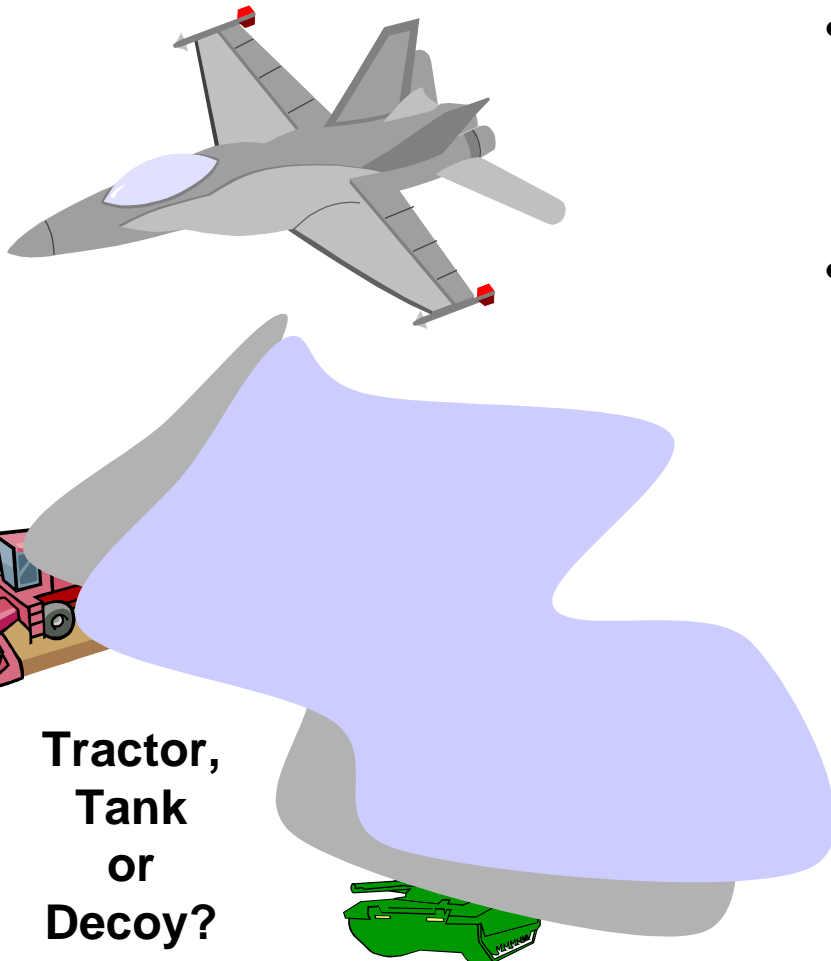


Issues Related to The Design And Use of Acoustic-Seismic Unattended Ground Sensors

**Dr. Gervasio Prado
SenTech, Inc.**

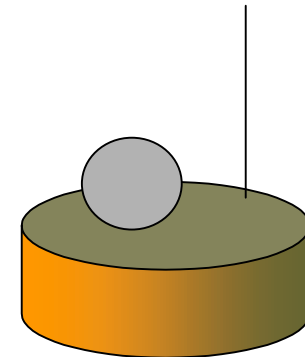
Unattended Ground Sensors - General Comments



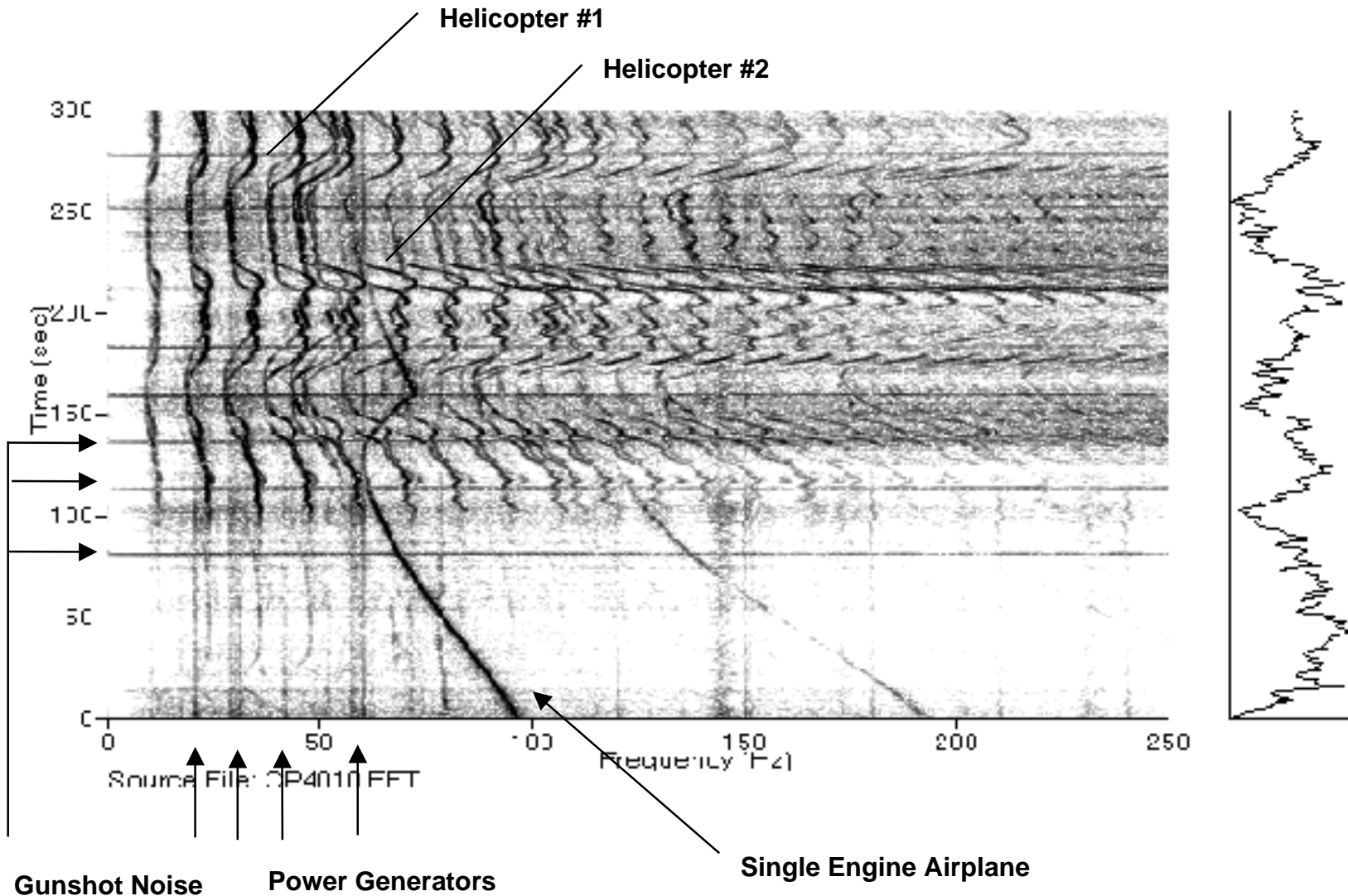
- Unattended Ground Sensors can provide valuable tactical information without risking soldiers.
- Acoustic and seismic sensors are the technology of choice for UGS:
 - Passive sensing
 - Non line of sight capability
 - Good discrimination, etc..

Unattended Ground Sensors - Key Issues

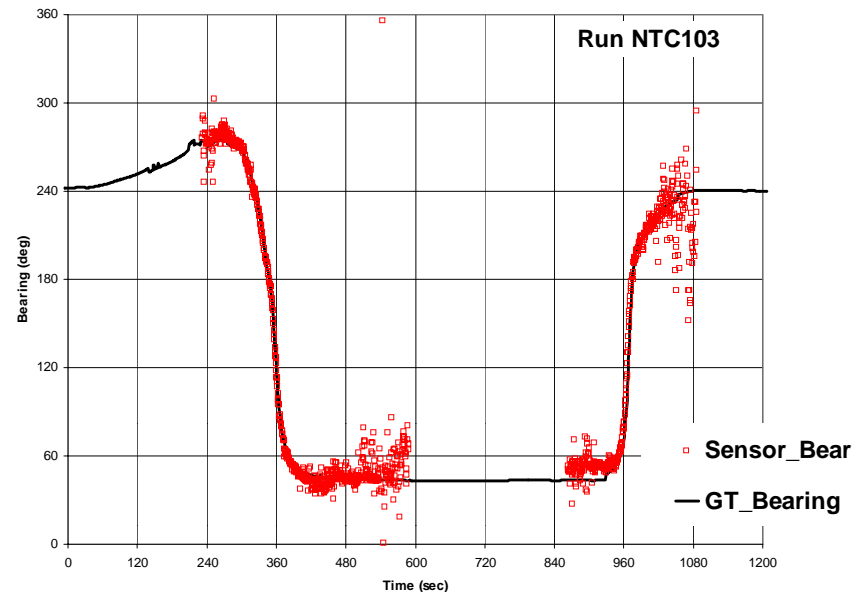
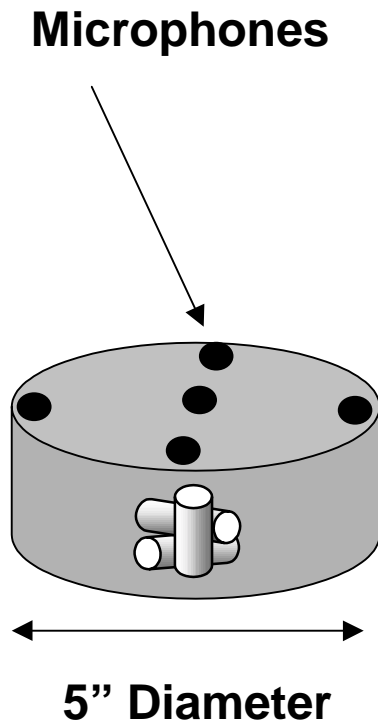
- **Functions:**
 - Target Detection
 - Target Classification and Identification
 - Localization and Tracking
- **Constraints:**
 - Low cost
 - Small Size
 - Low power



Spectrogram Of A Complex Scenario

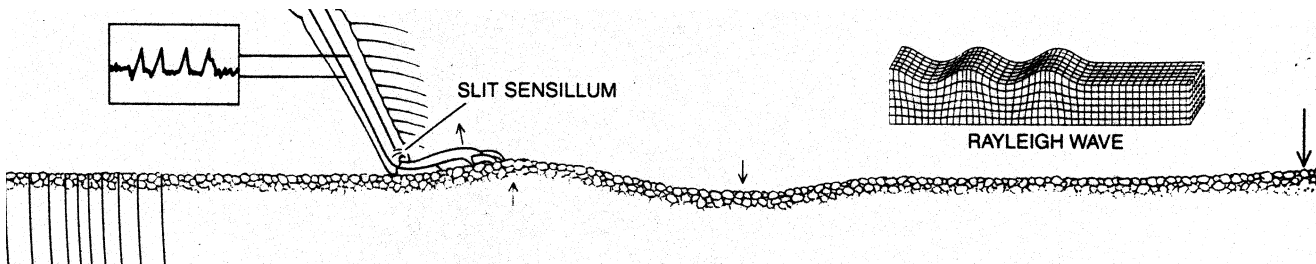
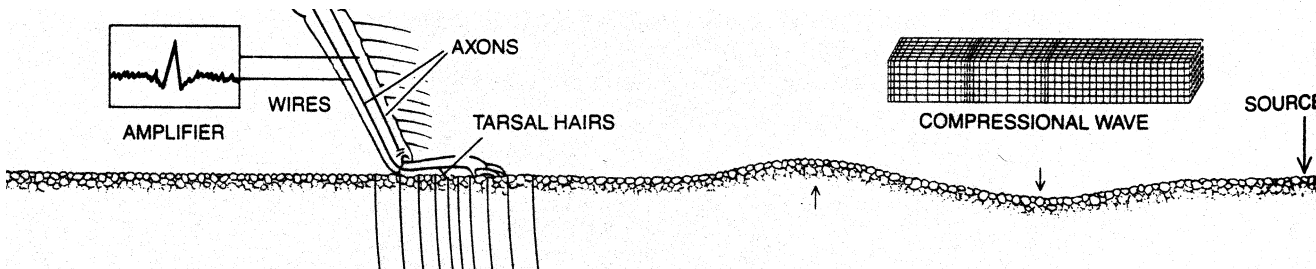
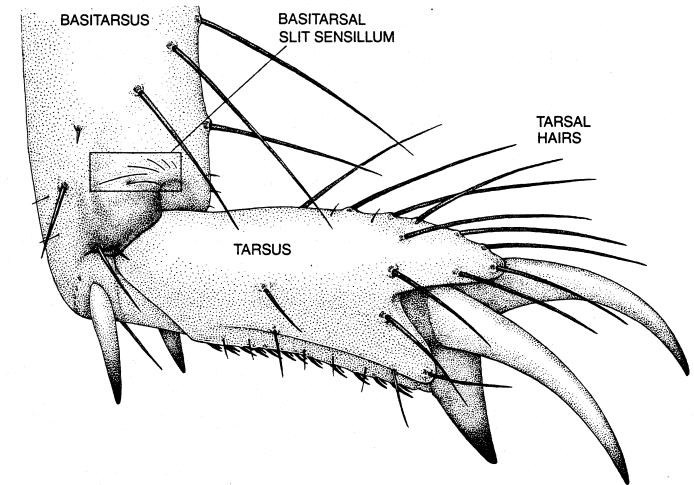
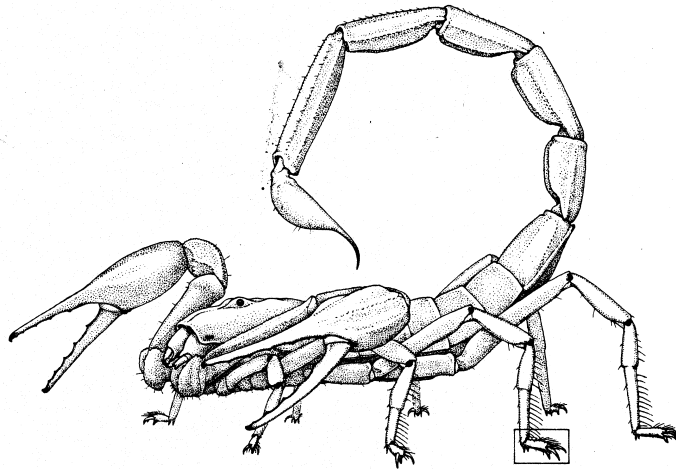


Acoustic Sensors Have Excellent Bearing Estimation Capabilities



- Bearing measurements are made using a phase comparison technique.
- Accuracy is limited by phase differences between microphones or their calibration errors.
 - Micro-machined microphones could provide phase-matched sensors.

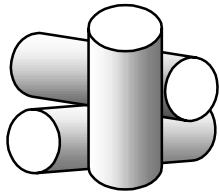
Sand Scorpion's Seismic Processing



P.H. Brownell, Prey Detection by the Sand Scorpion, Scientific. American, 1984.

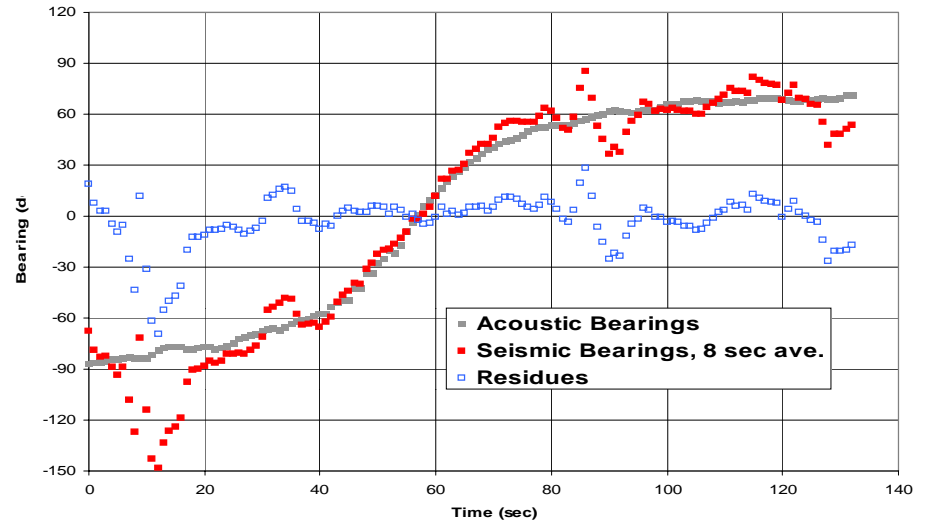
Sand Scorpion determines prey's direction and range by separating Rayleigh and pressure waves.

Three-Component Seismic Sensors



- Three component geophones give us the capability to separate pressure, shear and Rayleigh waves.
- Seismic estimation of bearing and range.

Bearing



Range

